

WHAT IS CLAIMED IS:

1. A removal cleaning method for a semiconductor substrate or a semiconductor device with metal wirings by using a remover composition,
5 wherein the remover composition comprises a dissolution agent having an alumina dissolution amount as measured according to the standard test (A-1) of 10 ppm or more, and an inhibitor having an aluminum etching amount as measured according to the standard test (B-1) of 7 nm or less, and the remover composition substantially does not contain a fluorine-containing compound.
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2. The removal cleaning method for a semiconductor substrate or a semiconductor device according to claim 1, wherein the dissolution agent is an acid.
- 15 3. The removal cleaning method for a semiconductor substrate or a semiconductor device according to claim 1 or 2, wherein the inhibitor is an inorganic acid salt and/or an organic acid salt.
4. The removal cleaning method for a semiconductor substrate or a semiconductor device according to any one of claims 1 to 3, wherein the
20 inhibitor is one or more salts selected from the group consisting of carboxylates, sulfates, sulfonates, phosphonates, nitrates, hydrochlorides and borates.
5. The removal cleaning method for a semiconductor substrate or a semiconductor device according to any one of claims 1 to 4, wherein a weight
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ratio of the dissolution agent to the inhibitor (dissolution agent/inhibitor) is 2/1 to 1/30.

6. The removal cleaning method for a semiconductor substrate or a semiconductor device according to any one of claims 1 to 5, wherein the remover composition comprises 50% by weight or more of water and has a pH of 1 to 10.

7. The removal cleaning method for a semiconductor substrate or a semiconductor device according to any one of claims 1 to 6, wherein the metal wirings comprise aluminum wirings having a wiring width of 180 nm or less.

8. A removal cleaning method for a semiconductor substrate or a semiconductor device with metal wirings having a wiring width of 180 nm or less by using a remover composition, wherein the remover composition comprises a dissolution agent having an alumina dissolution amount as measured according to the standard test (A-1) of 10 ppm or more, and an inhibitor having an aluminum etching amount as measured according to the standard test (B-1) of 7 nm or less.

9. The removal cleaning method for a semiconductor substrate or a semiconductor device according to any one of claims 1 to 8, wherein the metal wirings are metal wirings comprising one or more metals selected from the group consisting of aluminum, copper, tungsten and titanium.

10. A method of producing a semiconductor substrate or a semiconductor

device, comprising the step involving the removal cleaning method for a semiconductor substrate or a semiconductor device as defined in any one of claims 1 to 9.

- 5 11. A remover composition comprising an acid, and an inorganic acid salt and/or an organic acid salt, wherein the acid, and the inorganic acid salt and/or the organic acid salt are any one of the following (i) to (v):
- 10 (i) the acid is 1-hydroxyethylidene-1,1-diphosphonic acid, and the inorganic acid salt and/or the organic acid salt is one or more salts selected from the group consisting of carboxylates, sulfates, sulfonates, phosphonates, nitrates, hydrochlorides and borates;
- 15 (ii) the acid is sulfuric acid, and the inorganic acid salt is a sulfate and/or a nitrite;
- (iii) the acid is oxalic acid, and the inorganic acid salt is a phosphonate;
- (iv) the acid comprises sulfuric acid and oxalic acid, and the inorganic acid salt is a sulfate; and
- (v) the acid comprises 1-hydroxyethylidene-1,1-diphosphonic acid and oxalic acid, and the inorganic acid salt is a sulfate.
- 20 12. A remover composition, comprising a) water, and b) a compound having a solubility (25°C) in water of 10 g or more/100 g of water, wherein the content of the water a) is 50 to 99.8% by weight, and the content of the compound b) is 90% by weight or more of the portion of the remover composition excluding the water a), and the remover composition has an aluminum oxide dissolution
- 25 amount as measured according to the standard test (A-2) of 10 ppm or more, and

an aluminum etching amount as measured according to the standard test (B-2) of 7 nm or less.

13. The remover composition according to claim 12, wherein the remover composition comprises an acid, and an inorganic acid salt and/or an organic acid salt as the compound b).

14. The remover composition according to claim 13, wherein the acid is contained in an amount of 0.01 to 5% by weight, and the inorganic acid salt and/or the organic acid salt is contained in an amount of 0.2 to 40% by weight.

15. The remover composition according to any one of claims 12 to 14, wherein the remover composition has a pH of 1 to 10.

16. A method of cleaning a semiconductor by using the remover composition as defined in any one of claims 12 to 15.

17. The method of cleaning a semiconductor according to claim 16, wherein the semiconductor is a semiconductor with aluminum wirings having a wiring width of 180 nm or less.

18. A method of producing a semiconductor, comprising the step of cleaning using the cleaning method as defined in claim 16 or 17.

19. A water-based remover composition, comprising an aluminum oxide

dissolution agent and an aluminum corrosion inhibitor, wherein the water-based remover composition has: 1) a water content of 50% by weight or more; 2) an aluminum oxide dissolution amount as measured according to the standard test (A-2) of 10 ppm or more; 3) an aluminum etching amount as measured according to the standard test (B-2) of 7 nm or less; and provides 4) a pH change before and after the standard test (A-2) of 0.5 or less.

20. The remover composition according to claim 19, wherein the aluminum oxide dissolution agent is an acid, and the aluminum corrosion inhibitor is an inorganic acid salt and/or an organic acid salt.

21. The remover composition according to claim 19 or 20, wherein the remover composition has a pH of 1 to 10.

22. A method of continuous cleaning of a semiconductor, comprising the step of cleaning at 60°C or lower, by using the remover composition as defined in any one of claims 19 to 21.

23. The method of continuous cleaning of a semiconductor according to claim 22, wherein a semiconductor substrate or a semiconductor device with aluminum wirings having a wiring width of 180 nm or less is used.

24. A method of producing a semiconductor, comprising the step of cleaning using the method of continuous cleaning as defined in claim 22 or 23.